

## CLAIMS

1. A pre-purification unit of a cryogenic air separation unit, which is a thermal swing adsorption pre-purification unit comprising a column packed with a hydrocarbon  
5 adsorbent that comprises a zeolite with a H-FER structure or a MOR structure in which a pore diameter has been adjusted by ion exchange.
2. A pre-purification unit according to claim 1, wherein said column is packed with sequential layers of activated alumina, a NaX zeolite, and said hydrocarbon adsorbent.  
10
3. A pre-purification unit of a cryogenic air separation unit, which is a thermal swing adsorption pre-purification unit comprising a column packed with a propane adsorbent that comprises a zeolite with a MFI structure.
- 15 4. A pre-purification unit according to claim 3, wherein said column is packed with sequential layers of activated alumina, a NaX zeolite, and said propane adsorbent.
5. An adsorbent that is used in a pre-purification unit of a cryogenic air separation unit, wherein said adsorbent is a hydrocarbon adsorbent comprising a zeolite that has at  
20 least one straight channel.
6. A hydrocarbon adsorbent according to claim 5, wherein said hydrocarbon adsorbent has a H-FER structure.

7. A hydrocarbon adsorbent according to claim 5, wherein said hydrocarbon adsorbent has a MOR structure in which a pore diameter has been adjusted by ion exchange.

5 8. An adsorbent that is used in a pre-purification unit of a cryogenic air separation unit, wherein said adsorbent is a propane adsorbent comprising a zeolite with a MFI structure.

9. A propane adsorbent according to claim 8, wherein said propane adsorbent has a  
10 pore diameter, formed by ion exchange, that is substantially equal to a size of a propane molecular ion.

10. A propane adsorbent according to claim 9, wherein said ion exchange is conducted using either one, or two or more elements selected from the group consisting  
15 of Na, Cu, Li, K, Mg, Ca, Zn, Ag, Ba, Cs, Rb, and Sr.

11. An adsorbent that is used in a pre-purification unit of a cryogenic air separation unit, wherein said adsorbent is a propane adsorbent comprising a zeolite that has at least one straight channel, and has a Si/Al ratio of no more than 100.

20

12. A method of pre-treating feed air, comprising using a pre-purification unit according to claim 1 to reduce a hydrocarbon concentration within liquid oxygen inside said cryogenic air separation unit.

13. A method of pre-treating feed air, comprising using a pre-purification unit according to claim 3 to reduce propane concentration within liquid oxygen inside said cryogenic air separation unit.